

UNIT 1 (HIGHER TIER)

Applications Unit 1 Higher Tier June 2014	Mark	Comment
<p>1(a) Reason, e.g. outside the bookshop</p> <p>(b) Two boxes if you are 30</p> <p>(c) Suitable question with at least 3 boxes, no overlaps or gaps and prices from a low value upwards (to maybe £20) considered or a number of boxes given but concentrated at lower prices</p>	<p>E1</p> <p>E1</p> <p>B2</p> <p>4</p>	<p>Accept reference to people not buying, but checking out ready for downloading, 'showcasing', or that 'older people are more likely these days to buy from shops than younger people' Do not accept reference to groups under 20 and over 40.</p> <p>Or refers to widths groups for younger or older people, or unequal groups. Allow 'overlap(s)'. Ignore incorrect response if correct response is given. Do not accept 'doesn't give options for under 20s or over 40s', or '2 options for 20 year olds'</p> <p>B1 Suitable question with at least 3 boxes, with either consistent overlaps or gaps OR a suitable range of prices is not considered, OR B1 for suitable choice of groups with no gaps or overlaps but without a suitable question being asked</p> <p><i>Examples of consistent overlaps or gaps:</i> '£0 - £5, £5 - £10, £10 - ...' 'under £5, £6 - £10, £11 - £15, £16 - ...' 'over £5, over £10, over £20'* *however possible B2 if asked to tick only one box</p>
<p>2(a)(i) $180 + 73$ or $360 - 107$ $= 253^{(o)}$</p> <p>(ii) $360 - 42$ $= 318^{(o)}$</p> <p>(b) 60° with construction arcs (30° by) bisecting 'their angle', with arcs shown Correct 30° from appropriate construction with line shown at the right hand end of the line</p>	<p>M1 A1 M1 A1</p> <p>M1</p> <p>M1 A1 7</p>	<p><i>SC1 for answers of 073° and 138° in (i) and (ii)</i></p> <p>Accept anywhere on the line <i>Allow sight of construction arcs for 60°</i> Line (road) may not be shown Depends on both M marks</p>
<p>3(a) $7\text{cm} (\pm 0.2\text{cm}) \times 8 (\div 100)$ 0.56 (m)</p> <p>(b) Measuring 2 appropriate angles ($\pm 2^\circ$) to check allied, or appropriate corresponding or alternate angles</p> <p>Conclusion based on the angles measured and accurate knowledge of parallel line angle facts.</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>E1 4</p>	<p>Award M1 only for answers 56cm or 56m or 56 or similar from $\pm 0.2\text{cm}$ tolerance</p> <p>The size of angles may not actually be recorded, e.g. on diagram equal angles marked x and y. Accept references to the angles which are equal or sum to 180° <i>(Angle at D & E appropriately $110^\circ \pm 2^\circ$ or $70^\circ \pm 2^\circ$, Angle at A & B appropriately $108^\circ \pm 2^\circ$ or $72^\circ \pm 2^\circ$)</i> Do not accept 'travelling in the same direction so won't meet'</p>

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<p>4(a) (Number of necklaces is) $918 \div 34$ = 27 (necklaces)</p> <p>(Number of yellow beads is $27 \times 10 =$) 270 (Number of black beads is $27 \times 6 =$) 162</p> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> present work clearly, with words explaining process or steps <p>AND</p> <ul style="list-style-type: none"> make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> present work clearly, with words explaining process or steps <p>OR</p> <ul style="list-style-type: none"> make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer <p>(b) Deciding to make two bracelets 8 bags of purple beads 3 bags of green beads</p>	<p>M1 A1</p> <p>B1 B1</p> <p>QWC 2</p> <p>B1 B1 B1</p> <p>9</p>	<p><i>Note: Sight of 270 (yellow) or 162 (black) implies M1, A1</i></p> <p>FT their consistent 'derived 27' $\times 10$ correctly evaluated FT their consistent 'derived 27' $\times 6$ correctly evaluated</p> <p>QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p> <p>OR sight of needing 48 purple or 18 green</p> <p>Reversed answer: '3 purple bags and 8 green bags' following correct working award B1, SC1. Note intention to match 72s is incorrect working.</p> <p><i>If no marks, allow SC2 for 4 bracelets with 16 bags of purple beads and 6 bags of green beads, OR SC1 for other possible number of bracelets with the number of whole bags of purple and green correctly evaluated in the correct ratio</i></p>																																																
<p>5(a) $5(7x + 3)$ (b) $-16a - 11b$ (c) $9d - 6e - d + e$ = $8d - 5e$</p> <p>(d) One correct evaluation, $3 \leq x \leq 4$</p> <p>2 correct evaluations, $3.55 \leq x \leq 3.75$, one either side of 0</p> <p>2 correct evaluations, $3.55 \leq x \leq 3.65$, one either side of 0</p> <p>OR correct evaluation for $x = 3.65$ if previous B1 awarded</p> <p>3.6 <i>No calculations shown: accept "too high", ">", etc.</i></p>	<p>B1 B1 B1 B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>8</p>	<p>Allow $-16a (+) - 11b$ FT until 2nd error</p> <table border="0"> <tr> <td>x</td> <td>$x^3 - 2x - 40$</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>-19</td> <td></td> <td></td> </tr> <tr> <td>3.1</td> <td>-16.409</td> <td></td> <td></td> </tr> <tr> <td>3.2</td> <td>-13.632</td> <td></td> <td></td> </tr> <tr> <td>3.3</td> <td>-10.663</td> <td></td> <td></td> </tr> <tr> <td>3.4</td> <td>-7.496</td> <td></td> <td></td> </tr> <tr> <td>3.5</td> <td>-4.125</td> <td></td> <td></td> </tr> <tr> <td>3.6</td> <td>-0.544</td> <td>3.55</td> <td>-2.361125</td> </tr> <tr> <td>3.7</td> <td>3.253</td> <td>3.65</td> <td>1.327125</td> </tr> <tr> <td>3.8</td> <td>7.272</td> <td>3.75</td> <td>5.234375</td> </tr> <tr> <td>3.9</td> <td>11.519</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>16</td> <td></td> <td></td> </tr> </table> <p><i>Award SC1 for an unsupported answer of 3.6</i></p>	x	$x^3 - 2x - 40$			3	-19			3.1	-16.409			3.2	-13.632			3.3	-10.663			3.4	-7.496			3.5	-4.125			3.6	-0.544	3.55	-2.361125	3.7	3.253	3.65	1.327125	3.8	7.272	3.75	5.234375	3.9	11.519			4	16		
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<p>6(a)(i) Total number of rotten apples considered 9 Total number of apples considered 100 9/100 or equivalent</p> <p>(ii) 8×9 or equivalent 72 (rotten apples)</p> <p>(b) $2/24$ ISW ($=1/12 = 0.08333\dots$)</p>	<p>B1 B1 B1</p> <p>M1 A1</p> <p>B2 7</p>	<p>Allow $3/20+0/20+1/20+4/20+1/20$ leading to 9/100 as poor notation <i>Allow B2 for an answer of 1.8/20</i></p> <p>FT their (i) $\times 8$ <i>M1 only for an answer of 72/..., e.g. 72/800</i></p> <p>B1 for appropriate sight of '2 apples' considered as a response or answers of $3/24 (= 1/8 = 0.125)$ or $4/24 (= 1/6 = 0.1666\dots)$</p>
<p>7(a) 240, 300, 345, 440</p> <p>(b) Plots correct for their data at the mid interval with trend line drawn</p> <p>(c) Explanation, e.g. 'months not equal number of days', 'months about the same number of days'</p> <p>(d) 'NO', stated or implied with a suitable reason, e.g. 'will go down again as it gets to winter (autumn)', 'only rising as it now includes summer months', 'No in the long term as autumn and winter approach', 'no way of knowing'</p>	<p>B3</p> <p>B2</p> <p>E1</p> <p>E1</p> <p>7</p>	<p>OR B2 for any two correct entries, OR B1 for a correct method seen, or one correct entry</p> <p>B1 for correct plots at mid interval, or consistent translated plots with trend line drawn</p> <p>Accept 'yes' or 'no' depending on a reasonable explanation Allow 'NO, it makes it easier to plot with equal spaces', or 'NO, it still displays the data correctly' Do not accept 'YES, it gives inaccurate display', without an explanation of why</p> <p>Accept YES with an appropriate reason, e.g. 'Yes in the short term as August has yet to be included'</p>
<p>8. Straight lines parallel to all verticals and horizontals, with lines of radius distance away from the steps ($\pm 2\text{mm}$)</p> <p>All inner steps, locus turn at 90° vertex</p> <p>All outer steps, arcs with wheel radius ($\pm 2\text{mm}$)</p>	<p>B2</p> <p>B1</p> <p>B2</p> <p>5</p>	<p>B1 for straight lines, or series of points (>6), parallel to 2 verticals/horizontals, radius distance away ($\pm 2\text{mm}$), OR straight lines parallel to all 6 verticals and horizontals but not radius distance away <i>Do not accept curves with free hand sketches</i></p> <p>B1 for arcs with wheel radius ($\pm 2\text{mm}$) at 2 outer steps, OR intention of arcs at all outer steps but not necessarily at wheel radius <u>If B5 penalise extra lines drawn -1</u></p>
<p>9.(a)(i) $(800 - 300)/50 = 10$</p> <p>(ii) Explanation, e.g. 'extra cost per person', '£10 per person', '£100 extra for every 10 people'</p> <p>(iii) Explanation, e.g. 'fixed charge'</p> <p>(b) (£)200</p>	<p>M1 A1</p> <p>E1</p> <p>E1</p> <p>B1 5</p>	<p>Or equivalent</p> <p>Do not accept 'more people the more paid' FT from their gradient if reasonable</p> <p>Accept 'conference cost starts at £300', or 'hire cost'</p> <p>CAO</p>

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<p>10(a) 44, 76, 80 (b) Correct cumulative frequency diagram, points plotted at upper bounds and joined by a curve or straight line</p> <p>(c)</p> <table border="1"> <tr> <td>Median</td> <td>≈ 58 reading from graph</td> </tr> <tr> <td>Low quartile</td> <td>≈ 55.5 reading from graph</td> </tr> <tr> <td>Upper quartile</td> <td>≈ 61 reading from graph</td> </tr> <tr> <td>Interquartile range</td> <td>≈ 5.5</td> </tr> </table> <p>(d) Range ends correctly indicated (50(cm) and 68(cm)) Median line correctly indicated (approx. 58) UQ and LQ correctly indicated (approx. 61 & 55.5)</p>	Median	≈ 58 reading from graph	Low quartile	≈ 55.5 reading from graph	Upper quartile	≈ 61 reading from graph	Interquartile range	≈ 5.5	<p>B1 B2</p> <p>B1 B1 B1 B1</p> <p>B1</p> <p>B1 B1 10</p>	<p>Accuracy: nearer the intersection of correct lines than any others FT only if cumulative in (a) B1 for points correct but not joined, OR B1 correct apart from 0.5 translation, OR B1 if one error in plotting but joined correctly</p> <p>FT from their cumulative entries. Not cumulative means no FT. Accuracy of readings ±0.5</p> <p>FT their UQ – their LQ correctly evaluated. Independent FT</p> <p>In (d) FT consistent previous misread of scale Whiskers should be shown</p> <p>If incorrect then FT their median If incorrect then FT their UQ and LQ readings</p>						
Median	≈ 58 reading from graph															
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<p>11(a) Sight of $8(10+x) - x^2$ or $8 \times 10 + x(8-x)$</p> <p>Convincing $80 + 8x - x^2$</p> <p>(b) Finding at least two correct values for the area, either in working or plotted</p> <p>At least 4 correct plots All 6 points plotted accurately and joined with a curve</p> <p>(c) Either appropriate use of the graph or sight of $83.75 = 80 + 8x - x^2$ $x = 0.5$</p>	<p>M1</p> <p>A1 M1</p> <p>P1 C1 M1</p> <p>A1</p> <p>7</p>	<p>OR sight of appropriate areas, e.g. 8×10, $8 \times x$ and $x \times x$ Must follow from correct working In (b) ignore any points $x > 5$</p> <table border="1"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Area</td> <td>80</td> <td>87</td> <td>92</td> <td>95</td> <td>96</td> <td>95</td> </tr> </table> <p>FT from their graph. Allow inclusion of 7.5 with the answer 0.5. <i>An answer of 7.5 only implies M1, A0</i></p>	x	0	1	2	3	4	5	Area	80	87	92	95	96	95
x	0	1	2	3	4	5										
Area	80	87	92	95	96	95										
<p>12.</p> <table border="1"> <tr> <td>$(8^{1/2} + 4^{-1/2})$</td> <td>2.5</td> </tr> <tr> <td>$2.3 \times 10^{-1} + 9^0$</td> <td>1.2</td> </tr> <tr> <td>$3\sqrt{125^2} + 12 \times 160000^{-1/4}$</td> <td>26</td> </tr> </table>	$(8^{1/2} + 4^{-1/2})$	2.5	$2.3 \times 10^{-1} + 9^0$	1.2	$3\sqrt{125^2} + 12 \times 160000^{-1/4}$	26	<p>B1 B1 B1</p> <p>3</p>	<p>Allow 2.50 B0 for $0.23 + 1 = 1.23$, or 1.20 B0 for $25 + 0.6 = 25.6$, or 26.0 However if final 2 B marks are not awarded then SC1 for answers 1.23 and 25.6 respectively, or 1.20 and 26.0</p>								
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<p>13(a) Method of finding 1 correct area 2 correct areas AND intention to add all areas</p> <p>525</p> <p>(b) $1 \times 75 + 4 \times 25$ (=175) $\times 200$ (£) 3.5×10^4</p> <p>(c) No, stated or implied with a reason, e.g. ‘skew to offices greater than $80m^2$’, ‘the median (300^{th} value) lies within the 100–125 interval’, ‘No, the majority are greater than $80m^2$ (or $100m^2$)’</p>	<p>M1 M1</p> <p>A1</p> <p>M1 m1 A2</p> <p>E2</p> <p>9</p>	<p>Areas are $4 \times 25 + 6 \times 25 + 7 \times 25 + 2 \times 50$ $= 100 + 150 + 175 + 100$</p> <p>CAO. Answer of 600 by considering full area, is award M1, SC1</p> <p>A1 for 35000 If no marks, then SC1 for ‘their 175×200 correctly evaluated and expressed in standard form</p> <p>E1 for an answer that implies no with a statement implying that the median is greater than $80m^2$ but without giving a reason why, OR E1 for NO with an incorrect median stated in the range $100 < \text{median} < 125$ without further statement <i>Do not accept reference to mode</i></p>														

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14(a) Approximate period: 24 to 29 (minutes) (b) Tangent drawn at $t = 35$ Method, difference $y /$ difference x Evaluated answer from their reasonable tangent cm/min (c) $562 = \pi \times r^2$ $r = \sqrt{562/\pi}$ ($r = 13.37\dots$) $C = 2 \times \pi \times$ their r 80 (cm)	B1 B1 M1 A1 U1 M1 m1 M1 A2 10	Accept 25 to 30 (minutes) or 23 to 28 (minutes) Not necessarily from a tangent (<i>May be approximately 0.2</i>) Accept 'cm per min(ute)' FT their derived r A1 for 84.0...
15.(a) Finding the y values: (0,) 8, 7,(, 0) Use of trapezium rule or splitting into the 3 areas required and attempt to sum Complete correct calculation for the area required 30 (m) (b) 'Under estimate' with reason suggesting that trapezium is beneath the curve	B1 M1 A1 A1 E1 5	May be shown on their graph FT their values for y (8 + 15 + 7) CAO Treat splitting area into 6 parts as MR-1, then follow the stages of the mark scheme